

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1-45 (Canceled)

46. (Currently amended) A pharmaceutical composition comprising a phosphate acceptor compound (PAC) which is a protein or peptide which is at least partially dephosphorylated and a pharmaceutically-acceptable carrier, wherein the pharmaceutical composition is not an aqueous solution or a lyophilized material.

47. (Original) The composition of Claim 46 wherein the PAC is an extracellular phosphate acceptor compound (EPAC).

48. (Currently amended) The composition of Claim 47 wherein the EPAC is a phosvitin or a fragment thereof which is at least partially dephosphorylated.

49. (Original) The composition of Claim 48 wherein the phosvitin is chicken phosvitin.

50. (Original) The composition of Claim 48 wherein the phosvitin or fragment thereof is at least about 35% dephosphorylated.

51. (Original) The composition of Claim 50 wherein the phosvitin or fragment thereof is at least about 50% dephosphorylated.

52. (Original) The composition of Claim 51 wherein the phosvitin or fragment thereof is at least about 70% dephosphorylated.

53. (Original) The composition of Claim 52 wherein the phosvitin or fragment thereof is at least about 90% dephosphorylated.

54. (Currently amended) The composition of Claim 47 wherein the EPAC is a casein or a fragment thereof which is at least partially dephosphorylated.

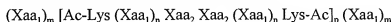
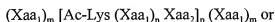
55. (Original) The composition of Claim 54 wherein the casein is an α -casein, a β -casein, a γ -casein, a κ -casein, a fragment of one of the foregoing, or a combination of one or more of the foregoing.

56. (Original) The composition of Claim 55 wherein the casein is an α_{s1} -casein or a fragment thereof.

57. (Currently amended) The composition of Claim 47 wherein the EPAC is an acylated albumin ~~which is at least partially dephosphorylated~~.

58. (Currently amended) The composition of Claim ~~57~~ 47 wherein the EPAC is an acetylated albumin which is at least partially dephosphorylated.

59. (Original) The composition of Claim 47 wherein the EPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is at least about twenty and/or each Xaa₁ is selected so that the peptide will be hydrophilic.

60. (Original) The composition of Claim 59 wherein the peptide is Ac-Lys Cys Ala Ser [SEQ ID NO:1] or Ac-Lys Ala Ser Ser Ala Lys-Ac [SEQ ID NO:2].

61. (Currently amended) The composition of Claim 47 wherein the EPAC is a mixture of plasma proteins ~~which are at least partially dephosphorylated~~.

62. (Original) The composition of Claim 47 wherein the EPAC is a kinase substrate.

63. (Original) The composition of Claim 62 wherein the kinase substrate is a casein kinase substrate having the sequence Arg Arg Lys Asp Leu His Asp Asp Glu Glu Asp Glu Ala Met Ser Ile Thr Ala [SEQ ID NO:3] or the sequence Arg Arg Arg Ala Asp Asp Ser Asp [SEQ ID NO:4].

64. (Original) The composition of Claim 47 wherein the EPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

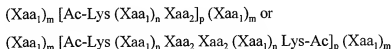
65. (Original) The composition of Claim 64 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

66. (Original) The composition of Claim 64 wherein the synthetic peptide comprises one or more phosphorylation sites.

67-71 (Canceled)

72. (Original) The composition of Claim 46 wherein the PAC is an intracellular phosphate acceptor compound (IPAC).

73. (Original) The composition of Claim 72 wherein the IPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is less than about twenty and each Xaa₁ is selected so that the peptide will be hydrophobic.

74. (Original) The composition of Claim 72 wherein the IPAC is a kinase substrate.

75. (Original) The composition of Claim 72 wherein the IPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

76. (Original) The composition of Claim 75 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

77. (Original) The composition of Claim 75 wherein the synthetic peptide comprises one or more phosphorylation sites.

78-80 (Canceled)

81. (Currently amended) A kit for contacting a cell, a tissue or an organ that has been removed from an animal with an extracellular phosphate acceptor compound (EPAC) or a combination of EPACs, the kit comprising:

(a) one or a combination of the following:

a container holding an EPAC;

a container holding a combination of EPACs [[:]] ; or

a plurality of containers each holding an EPAC, wherein each of the plurality of EPACs may be the same as, or different than, the other EPAC(s); and

(b) instructions describing how to use the kit to contact a cell, tissue or organ with the EPAC(s) in the kit.

82-185 (Canceled)

186. (New) A pharmaceutical composition which is formulated for topical administration to an animal and which is not an aqueous solution, the composition comprising a phosphate acceptor compound (PAC) which is a protein or peptide which is at least partially dephosphorylated and a pharmaceutically-acceptable carrier.

187. (New) The composition of Claim 186 wherein the protein or peptide is at least about 20% dephosphorylated.

188. (New) The composition of Claim 187 wherein the protein or peptide is at least about 35% dephosphorylated.

189. (New) The composition of Claim 187 wherein the protein or peptide is at least about 50% dephosphorylated.

190. (New) The composition of Claim 187 wherein the protein or peptide is at least about 70% dephosphorylated.

191. (New) The composition of Claim 197 wherein the protein or peptide is at least about 90% dephosphorylated.

192. (New) The composition of Claim 186 wherein the PAC is an extracellular phosphate acceptor compound (EPAC).

193. (New) The composition of Claim 192 wherein the EPAC is a phosvitin or a fragment thereof.

194. (New) The composition of Claim 193 wherein the phosvitin is chicken phosvitin.

195. (New) The composition of Claim 193 wherein the phosvitin or fragment thereof is at least about 20% dephosphorylated.

196. (New) The composition of Claim 193 wherein the phosvitin or fragment thereof is at least about 35% dephosphorylated.

197. (New) The composition of Claim 193 wherein the phosvitin or fragment thereof is at least about 50% dephosphorylated.

198. (New) The composition of Claim 193 wherein the phosvitin or fragment thereof is at least about 70% dephosphorylated.

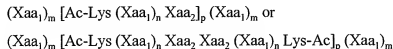
199. (New) The composition of Claim 193 wherein the phosvitin or fragment thereof is at least about 90% dephosphorylated.

200. (New) The composition of Claim 192 wherein the EPAC is a casein or a fragment thereof.

201. (New) The composition of Claim 200 wherein the casein is an α -casein, a β -casein, a γ -casein, a κ -casein, a fragment of one of the foregoing, or a combination of one or more of the foregoing.

202. (New) The composition of Claim 201 wherein the casein is an α_{s1} -casein or a fragment thereof.

203. (New) The composition of Claim 192 wherein the EPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is at least about twenty and/or each Xaa₁ is selected so that the peptide will be hydrophilic.

204. (New) The composition of Claim 203 wherein the peptide is Ac-Lys Cys Ala Ser [SEQ ID NO:1] or Ac-Lys Ala Ser Ser Ala Lys-Ac [SEQ ID NO:2].

205. (New) The composition of Claim 192 wherein the EPAC is a kinase substrate.

206. (New) The composition of Claim 205 wherein the kinase substrate is a casein kinase substrate having the sequence Arg Arg Lys Asp Leu His Asp Asp Glu Glu Asp Glu Ala Met Ser Ile Thr Ala [SEQ ID NO:3] or the sequence Arg Arg Arg Ala Asp Asp Ser Asp [SEQ ID NO:4].

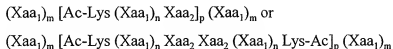
207. (New) The composition of Claim 192 wherein the EPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

208. (New) The composition of Claim 207 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

209. (New) The composition of Claim 207 wherein the synthetic peptide comprises one or more phosphorylation sites.

210. (New) The composition of Claim 186 wherein the PAC is an intracellular phosphate acceptor compound (IPAC).

211. (New) The composition of Claim 210 wherein the IPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is less than about twenty and each Xaa₁ is selected so that the peptide will be hydrophobic.

212. (New) The composition of Claim 210 wherein the IPAC is a kinase substrate.

213. (New) The composition of Claim 210 wherein the IPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

214. (New) The composition of Claim 213 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

215. (New) The composition of Claim 213 wherein the synthetic peptide comprises one or more phosphorylation sites.

216. (New) The composition of Claim 210 wherein the IPAC is attached to a targeting molecule.

217. (New) The pharmaceutical composition of Claim 186 which is formulated for topical administration to the skin of an animal.

218. (New) The pharmaceutical composition of Claim 186 which is formulated as drops, a spray, an aerosol or an inhalant.

219. (New) The pharmaceutical composition of Claim 186 which is formulated as a powder or a foam.

220. (New) The pharmaceutical composition of Claim 186 which is formulated as a lotion, a gel, a cream, an ointment or a paste.

221. (New) The composition of Claim 210 wherein the PAC is an extracellular phosphate acceptor compound (EPAC).

222. (New) The composition of Claim 221 wherein the EPAC is a phosvitin or a fragment thereof.

223. (New) The composition of Claim 222 wherein the phosvitin is chicken phosvitin.

224. (New) The composition of Claim 222 wherein the phosvitin or fragment thereof is at least about 20% dephosphorylated.

225. (New) The composition of Claim 222 wherein the phosvitin or fragment thereof is at least about 35% dephosphorylated.

226. (New) The composition of Claim 222 wherein the phosvitin or fragment thereof is at least about 50% dephosphorylated.

227. (New) The composition of Claim 222 wherein the phosvitin or fragment thereof is at least about 70% dephosphorylated.

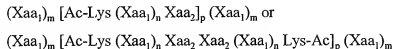
228. (New) The composition of Claim 222 wherein the phosvitin or fragment thereof is at least about 90% dephosphorylated.

229. (New) The composition of Claim 221 wherein the EPAC is a casein or a fragment thereof which is at least partially dephosphorylated.

230. (New) The composition of Claim 229 wherein the casein is an α -casein, a β -casein, a γ -casein, a κ -casein, a fragment of one of the foregoing, or a combination of one or more of the foregoing.

231. (New) The composition of Claim 230 wherein the casein is an α_{s1} -casein or a fragment thereof.

232. (New) The composition of Claim 221 wherein the EPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is at least about twenty and/or each Xaa₁ is selected so that the peptide will be hydrophilic.

233. (New) The composition of Claim 232 wherein the peptide is Ac-Lys Cys Ala Ser [SEQ ID NO:1] or Ac-Lys Ala Ser Ser Ala Lys-Ac [SEQ ID NO:2].

234. (New) The composition of Claim 221 wherein the EPAC is a kinase substrate.

235. (New) The composition of Claim 234 wherein the kinase substrate is a casein kinase substrate having the sequence Arg Arg Lys Asp Leu His Asp Asp Glu Glu Asp Glu Ala Met Ser Ile Thr Ala [SEQ ID NO:3] or the sequence Arg Arg Arg Ala Asp Asp Ser Asp [SEQ ID NO:4].

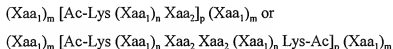
236. (New) The composition of Claim 221 wherein the EPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

237. (New) The composition of Claim 236 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

238. (New) The composition of Claim 236 wherein the synthetic peptide comprises one or more phosphorylation sites.

239. (New) The composition of Claim 210 wherein the PAC is an intracellular phosphate acceptor compound (IPAC).

240. (New) The composition of Claim 239 wherein the IPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is less than about twenty and each Xaa₁ is selected so that the peptide will be hydrophobic.

241. (New) The composition of Claim 239 wherein the IPAC is a kinase substrate.

242. (New) The composition of Claim 239 wherein the IPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

243. (New) The composition of Claim 242 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

244. (New) The composition of Claim 242 wherein the synthetic peptide comprises one or more phosphorylation sites.

245. (New) The composition of Claim 239 wherein the IPAC is attached to a targeting molecule.

246. (New) The pharmaceutical composition of Claim 220 which is an ointment or a cream.

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247. (New) The composition of Claim 210 wherein the PAC is an extracellular phosphate acceptor compound (EPAC).

248. (New) The composition of Claim 247 wherein the EPAC is a phosvitin or a fragment thereof.

249. (New) The composition of Claim 248 wherein the phosvitin is chicken phosvitin.

250. (New) The composition of Claim 248 wherein the phosvitin or fragment thereof is at least about 20% dephosphorylated.

251. (New) The composition of Claim 248 wherein the phosvitin or fragment thereof is at least about 35% dephosphorylated.

252. (New) The composition of Claim 248 wherein the phosvitin or fragment thereof is at least about 50% dephosphorylated.

253. (New) The composition of Claim 248 wherein the phosvitin or fragment thereof is at least about 70% dephosphorylated.

254. (New) The composition of Claim 248 wherein the phosvitin or fragment thereof is at least about 90% dephosphorylated.

255. (New) The composition of Claim 247 wherein the EPAC is a casein or a fragment thereof which is at least partially dephosphorylated.

256. (New) The composition of Claim 255 wherein the casein is an α -casein, a β -casein, a γ -casein, a κ -casein, a fragment of one of the foregoing, or a combination of one or more of the foregoing.

257. (New) The composition of Claim 256 wherein the casein is an α_{s1} -casein or a fragment thereof.

258. (New) The composition of Claim 247 wherein the EPAC is a peptide having the sequence:

$(Xaa_1)_m [Ac-Lys (Xaa_1)_n Xaa_2]_p (Xaa_1)_m$ or

$(Xaa_1)_m [Ac-Lys (Xaa_1)_n Xaa_2 Xaa_2 (Xaa_1)_n Lys-Ac]_p (Xaa_1)_m$

wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is at least about twenty and/or each Xaa₁ is selected so that the peptide will be hydrophilic.

259. (New) The composition of Claim 258 wherein the peptide is Ac-Lys Cys Ala Ser [SEQ ID NO:1] or Ac-Lys Ala Ser Ser Ala Lys-Ac [SEQ ID NO:2].

260. (New) The composition of Claim 247 wherein the EPAC is a kinase substrate.

261. (New) The composition of Claim 260 wherein the kinase substrate is a casein kinase substrate having the sequence Arg Arg Lys Asp Leu His Asp Asp Glu Glu Asp Glu Ala Met Ser Ile Thr Ala [SEQ ID NO:3] or the sequence Arg Arg Arg Ala Asp Asp Ser Asp [SEQ ID NO:4].

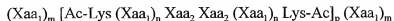
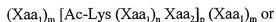
262. (New) The composition of Claim 247 wherein the EPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

263. (New) The composition of Claim 262 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

264. (New) The composition of Claim 262 wherein the synthetic peptide comprises one or more phosphorylation sites.

265. (New) The composition of Claim 210 wherein the PAC is an intracellular phosphate acceptor compound (IPAC).

266. (New) The composition of Claim 265 wherein the IPAC is a peptide having the sequence:



wherein:

Ac is an acyl group;

Xaa₁ is any amino acid;

Xaa₂ is serine, threonine or tyrosine;

m is 0-10;

n is 1-3;

p is 1-5; and

m, n and p are selected so that the total number of amino acids is less than about twenty and each Xaa_i is selected so that the peptide will be hydrophobic.

267. (New) The composition of Claim 265 wherein the IPAC is a kinase substrate.

268. (New) The composition of Claim 265 wherein the IPAC is a synthetic peptide comprising one or more phosphorylatable amino acids.

269. (New) The composition of Claim 268 wherein the synthetic peptide comprises one or more serines, threonines and/or tyrosines in a random sequence.

270. (New) The composition of Claim 268 wherein the synthetic peptide comprises one or more phosphorylation sites.

271. (New) The composition of Claim 265 wherein the IPAC is attached to a targeting molecule.

272. (New) A pharmaceutical composition comprising a phosphate acceptor compound (PAC) which is a protein or peptide and which has a targeting molecule attached to it and a pharmaceutically-acceptable carrier.

273. (New) The composition of Claim 272 wherein the PAC is an extracellular phosphate acceptor compound (EPAC).

274. (New) The composition of Claim 272 wherein the PAC is an intracellular phosphate acceptor compound (IPAC).

275. (New) The composition of Claim 272 wherein the protein or peptide is at least about 20% dephosphorylated.

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276. (New) The composition of Claim 272 wherein the protein or peptide is at least about 35% dephosphorylated.

277. (New) The composition of Claim 272 wherein the protein or peptide is at least about 50% dephosphorylated.

278. (New) The composition of Claim 272 wherein the protein or peptide is at least about 70% dephosphorylated.

279. (New) The composition of Claim 272 wherein the protein or peptide is at least about 90% dephosphorylated.

280. (New) The composition of Claim 48 wherein the phosphitin or fragment thereof is at least about 20% dephosphorylated.